PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re application of	Docket No: Q65824
Hironori MIZUGUCHI	
Appln. No.: 09/924,723	Group Art Unit: 2631
Confirmation No.: 3958	Examiner: Shaima Q. AMINZAY

Filed: August 9, 2001

For: TRANSMISSION POWER CONTROL SYSTEM AND METHOD CAPABLE OF SAVING BATTERY CONSUMPTION OF MOBILE STATION AND PREVENTING CONNECTION CAPACITY FROM BEING REDUCED

SUBMISSION OF APPEAL BRIEF

MAIL STOP APPEAL BRIEF - PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

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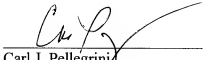
Respectfully submitted,



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Date: June 9, 2008

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APPEAL BRIEF UNDER 37 C.F.R. § 41.37

MAIL STOP APPEAL BRIEF - PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In accordance with the provisions of 37 C.F.R. § 41.37, Appellant submits the following:

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I. REAL PARTY IN INTEREST

The real party in interest in this appeal is NEC CORPORATION. Assignment of the application was submitted to the U.S. Patent and Trademark Office on August 9, 2001, and recorded on the same date at Reel 012071, Frame 0178.

II. RELATED APPEALS AND INTERFERENCES

There are no known appeals or interferences that will affect, be directly affected by, or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1-42 stand finally rejected.

The rejections of claims 1-42 are being appeal.

IV. STATUS OF AMENDMENTS

No amendments have been filed subsequent to the final rejection.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER

This invention relates to a transmission power control system and method for use in a digital mobile communication system, in particular to a reverse-link transmission power control system of the digital mobile communication system to control reverse-link transmission power. Specification, page 1, lines 6-9.

The independent claim limitations are disclosed in the specification and drawings in at least the following places. In additional, further background on the claimed invention is provided thereafter.

1. A base station (item 10, figure 4) of a mobile communication system (figure 4) comprising:

a communication monitor circuit (item 41, figure 4) for detecting quality deterioration of radio communication with mobile stations (item 20-1, 20-n, 20-N, figure 4), wherein:

said communication monitor circuit comprises:

a monitor unit for monitoring a communication state of said radio communication (page 4:21-23, page 14:13-17);

a judging unit coupled to said monitor unit for judging whether said communication state monitored by said monitor unit is worse than a predetermined state (page 4:23-25, page 13:21-25); and

a notifying unit coupled to said judging unit for notifying an external circuit of said quality deterioration when said judging unit judges that said communication state is worse than said predetermined state (page 4:25 to page 5:1, page 14:2-6).

6. A base station (item 10, figure 10) of a mobile communication system (figure 10) comprising:

receivers (item 11-1, 11-N, figure 10) for demodulating transmission signals transmitted from mobile stations to produce demodulated signals (page 10:9-12)

signal-to-noise ratio determining circuits (item 13-1, 13-N, figure 10) coupled to said receivers, respectively, for determining signal-to-noise ratios of said demodulated signals (page 10:20-23);

transmission power control bit generators (item 14-1, 14-N, figure 10) coupled to said signal-to-noise ratio determining circuits, respectively, for generating said transmission power control bit signals based on said signal-to-noise ratios (page 10:24-27);

a communication state monitor circuit (item 101, figure 10) coupled to said receivers for detecting quality deterioration of a communication state of radio communication between said base station and said mobile stations (page 17:1-17); and

a transmission power bit adjusting circuit (item 42, figure 10) coupled to said communication state monitor circuit and said transmission power control bit generators for controlling said transmission power control bit signals so as to suppress an increase of

transmission power of said mobile stations when said communication state monitor circuit detects said quality deterioration (page 14:7-12, page 15:10-17).

14. A transmission power control system (figure 10) for use in a base station (item 10, figure 10) of a mobile communication system, said base station including receivers (item 11-1, 11-N, figure 10) for demodulating transmission signals (page 10:9-12) transmitted from said mobile stations to produce demodulated signals, signal-to-noise ratio determining circuits (item 13-1, 13-N, figure 10) coupled to said receivers, respectively, for determining signal-to-noise ratios of said demodulated signals (page 10:20-23) and transmission power control bit generators (item 14-1, 14-N, figure 10) connected to said signal-to-noise ratio determining circuits respectively for generating said transmission power control bit signals based on said signal-to-noise rations (page 10:24-27), said transmission power control system comprising:

a communication state monitor circuit (item 101, figure 10) coupled to said receivers for detecting quality deterioration of a communication state of radio communication between said base station and said mobile stations (page 17:1-17); and

a transmission power bit adjusting circuit (item 42, figure 10) coupled to said communication state monitor circuit and said transmission power control bit generators for controlling said transmission power control bit signals so as to suppress an increase of transmission power of said mobile stations when said communication state monitor circuit detects said quality deterioration (page 14:7-12, page 15:10-17).

22. A method of controlling transmission power of mobile stations (item 20-1, 20-n, 20-N, figure 4) from a base station (item 10, figure 4) of a mobile communication system (figure 4), comprising:

monitoring, at said base station, a communication state of radio communication between said base station and said mobile stations (page 4:21-23, page 14:13-17);

judging, at said base station, whether said monitored communication state is worse than a predetermined state (page 4:23-25, page 13:21-25); and

notifying, in said base station, an external circuit of said quality deterioration when said communication state is judged to be worse than said predetermined state (page 4:25 to page 5:1, page 14:2-6).

27. A method of controlling transmission power of mobile stations (item 20-1, 20-n, 20-N, figure 4) of a mobile communication system (figure 4) by use of transmission power control bit signals (page 10:24-27) transmitted from a base station (item 10, figure 4), comprising:

demodulating transmission signals transmitted from said mobile stations to produce demodulated signals (page 10:9-12);

determining signal-to-noise ratios of said demodulated signals (page 10:20-23);

generating said transmission power control bit signals on the basis of said signal-to-noise rations (page 10:24-27);

detecting, at said base station, quality deterioration of a communication state of radio communication between said base station and said mobile stations (page 17:1-17); and

controlling, at said base station, said transmission power control bit signals so as to suppress an increase of transmission power of said mobile stations when said quality deterioration is detected (page 14:7-12, page 15:10-17).

35. A base station (item 10, figure 10) in a mobile communication system (figure 10) comprising:

a receiver (item 11-1, 11-N, figure 10) which demodulates transmission signals transmitted from plural mobile stations (page 10:9-12);

a communication state monitor (item 101, figure 10), coupled to said receiver, which detects a deterioration of a communication state of radio communication between said base station and the plural mobile stations (page 17:1-17);

a transmission power control signal adjusting circuit (item 42, figure 10), coupled to said communication state monitor, which controls transmission power control signals so as to decrease the transmission power of the plural mobile stations if said communication sate monitor detects the deterioration (page 14:7-12, page 15:10-17); and

a transmitter (item 16, figure 10), coupled to said transmission power control signal adjusting circuit, which transmits the transmission power control signals to the plural mobile stations .

37. A mobile station among plural mobile stations (item 20-1, 20-n, 20-N, figure 4), in a mobile communication system (figure 4), comprising:

a transmitter (item 16, figure 4) which transmits a signal to a base station (item 10, figure 4);

a receiver (item 21-1, 21-n, figure 4) which receives, from the base station, a transmission power control signal directing to decrease a power of the signal to be transmitted to the base station in the case where a deterioration of a communication sate of radio communication between the base station and the plural mobile stations is detected at the base station (page 11:2-21); and

a transmission power controller (item 24-1, 24-n, figure 4) which decides a transmission power of the signal to be transmitted to the base station based on the transmission power control signal (page 12:11-15).

39. A mobile communication system (figure 10) comprising a base station (item 10, figure 10) and plural mobile stations (item 20-1, 20-n, 20-N, figure 10), wherein said base station comprises:

a receiver (item 11-1, 11-N, figure 10) which demodulates transmission signals transmitted from said plural mobile stations (page 10:9-12);

a communication state monitor (item 101, figure 10), coupled to said receiver, which detects a deterioration of a communication state of radio communication between said base station and said plural mobile stations (page 17:1-17);

a transmission power control signal adjusting circuit (item 42, figure 10), coupled to said communication state monitor, which controls transmission power control signals so as to decrease the transmission power of said plural mobile stations if said communication sate monitor detects the deterioration (page 14:7-12, page 15:10-17); and

a transmitter (item 16, figure 10), coupled to said transmission power control signal adjusting circuit, which transmits the transmission power control signals to the plural mobile stations, and

each of said mobile stations comprises:

a transmitter (item 25-1, 25-n, figure 10) which transmits a signal to said base station;

a receiver (item 21-1, 21-n, figure 10) which receives one of the transmission power control signals from the base station; and

a transmission power controller (item 24-1, 24-n, figure 10) which decides a transmission power of the signal to be transmitted to said base station based on the transmission power control signal received by said receiver.

40. A method, for a mobile communication system (figure 10) comprising a base station (item 10, figure 10) and plural mobile stations (item 20-1, 20-n, 20-N, figure 10), comprising:

demodulating transmission signals transmitted from the plural mobile stations (page 10:9-12);

detecting, at the base station, a deterioration of a communication state of radio communication between said base station and the plural mobile stations (page 17:1-17);

controlling, at the base station, power control signals so as to decrease the transmission power of the plural mobile stations if said communication sate monitor detects the deterioration (page 14:7-12, page 15:10-17); and

transmitting the transmission power control signals to the plural mobile stations (item 16, figure 10).

41. A method, for a mobile communication system (figure 4) comprising a base station (item 10, figure 4) and plural mobile stations (item 20-1, 20-n, 20-N, figure 4), comprising:

transmitting a signal to the base station (item 25-1, 25-n, figure 10);

receiving, from the base station, a transmission power control signal directing to decrease a power of the signal to be transmitted to the base station in the case where a deterioration of a communication sate of radio communication between the base station and the plural mobile stations is detected at the base station (item 21-1, 21-n, figure 10); and

deciding a transmission power of the signal to be transmitted to the base station based on the transmission power control signal (item 24-1, 24-n, figure 10).

42. A method for a mobile communication system (figure 10), comprising a base station (item 10, figure 10) and plural mobile stations (item 20-1, 20-n, 20-N, figure 10), comprising:

demodulating transmission signals transmitted from the plural mobile stations (page 10:9-12);

detecting, at the base station, a deterioration of a communication state of radio communication between said base station and the plural mobile stations (page 17:1-17);

controlling, at the base station, transmission power control signals so as to decrease the transmission power of the plural mobile stations if said communication sate monitor detects the deterioration (page 14:7-12, page 15:10-17);

transmitting the transmission power control signals to the plural mobile stations (item 16, figure 10);

transmitting a signal to the base station (item 25-1, 25-n, figure 10);

receiving one of the transmission power control signals form the base station (item 21-1, 21-n, figure 10); and

deciding a transmission power of the signal to be transmitted to the base station based on the transmission power control signal received (item 24-1, 24-n, figure 10).

In the digital mobile communication system, the reverse-link (or up-link) transmission power is generally controlled to save battery consumption of mobile stations with keeping a desired receiving quality at a base station which communicate with the mobile stations and to control interference between transmission signals transmitted from the mobile stations. Especially, such transmission power control is indispensable for the code division multiple access (CDMA) system because the mobile stations simultaneously uses a common frequency

band in the CDMA system. The common frequency band is also used in other cells adjoining the cell covered by the base station in the CDMA system. Specification, page 1, lines 10-20.

When the number of the mobile stations, which communicate with the base station, increases, and interference between the reverse-link transmission signals of the mobile stations becomes large, the conventional transmission power control system makes the mobile stations increase the transmission power. Similarly, when interference from adjoining cells increases, the base station also makes the mobile stations increase the transmission power. In these cases, the increase of the transmission power of the mobile stations often makes the SNRs of the demodulated signals at the base station worse. The transmission power control system can not decide whether the increase of the transmission power of the mobile station improves the SNRs of the demodulated signals or not. In addition, the mobile stations waste batteries because they transmit the reverse-link transmission signals with the maximum power in these cases. Furthermore, it makes the interference for adjoining cells large and makes connection capacity of the mobile communication system small that the mobile stations transmit the reverse-link transmission signals with the maximum power. Specification, page 12, line 19 to page 13, line 7.

The transmission power control system of Appellant's invention is applied to a mobile communication system adopting CDMA system. The mobile communication system comprises base stations and mobile stations. The base station 10 comprises receivers 11-1 to 11-N. Decoders 12-1 to 12-N are connected to the receivers 11-1 to 11-N, respectively. Signal-to-noise (SNR) determining circuits 13-1 to 13-N are also connected to the receivers 11-1 to 11-N, respectively. Transmission power control (TPC) bit generators 14-1 to 14-N are connected to the

SNR determining circuits 13-1 to 13-N. A communication state monitor 41 is connected to the SNR determining circuits 13-1 to 13-N, while a TPC bit adjusting circuit 42 is connected to the communication state monitor 41, the TPC bit generators 14-1 to 14-N and multiplexers 15-1 to 15-N. A transmitter 16 is connected to all of the multiplexers 15-1 to 15-N. Specification, page 9, lines 5-19; -page 13, lines 15-18.

The base station can simultaneously communicate with the mobile stations located in a cell covered by the base station. For purposes of the claimed invention, it is assumed that the mobile stations simultaneously communication with the base station. A representative mobile station is shown as item 20-n. The mobile station 20-n comprises a receiver 21-n. A decoder 22-n connected to the receiver 21-n. A transmission power control (TPC) bit decoder 23-n is also connected to the receiver 21-n. A transmission power deciding circuit 24-n is connected to the bit decoder 23-n. A transmitter 25-n is connected to the transmission power deciding circuit 24-n. A combination of the TPC bit decoder 23-n and the transmission power deciding circuit 24-n serves as another part of the conventional transmission power control system. Specification, page 9, line 20 to page 10, line 6.

The mobile station 20-n receives the forward-link transmission signal. In the mobile station 20-n, the receiver 21-n demodulates the forward-link transmission signal and extracts the multiplexed signal produced by the multiplexer 15-n (Step S301). The mobile station 20-n supplies the extracted multiplexed signal to both of the decoder 22-n and the TPC decoder 23-n. Specification, page 11, lines 20-25.

The decoder 22-n extracts the encoded forward-link information signal from the extracted multiplexed signal and decodes the encoded forward-link information signal into a decoded forward-link information signal (Step S 302). Error detection and correction is made for the decoded forward-link information signal. Because the decoded forward-link information is not important for this invention, no description will be made about processing for the decoded forward-link information signal. Specification, page 11, line 26 to page 12, line 5.

On the other hand, the TPC bit decoder 23-n extracts the TPC bit signal from the extracted multiplexed signal and decodes the extracted TPC bit signal into a decoded TPC bit signal (Step S303). The TPC bit decoder 23-n supplies the decoded TPC bit signal to the transmission power deciding circuit 24. The transmission power deciding circuit 24 decides the transmission power of the transmitter 25 in response to the decoded TPC bit signal (Step S304). However, the transmission power deciding circuit 24 restricts the transmission power under a predetermined maximum power. The transmitter 25 transmits the reverse-link transmission signal with the decided transmission power decided by the transmission power deciding circuit 24 thereafter (Step S305). Specification, page 12, lines 6-18.

For the base station 10, the transmission power control system operates according a flowchart illustrated in Fig. 5. At a step S501 of Fig. 5, the communication state monitor 41 receives the SNR signals supplied from the SNR bit determining circuits 13-1 to 13-N and decides whether a communication state between the base station 10 and the mobile stations 20-1 to 20-N keeps worse than a predetermined state for a predetermined time. When the communication state keeps worse than the predetermined state for the predetermined time, it can

be considered that many of the detected SNRs are lower than the desired SNR because of the interference and the detected SNRs can not be improved by increase of the transmission power of the mobile stations. The communication state monitor 41 notifies the TPC bit adjusting circuit 42 of quality deterioration of the communication between the base station 10 and the mobile stations 20-1 to 20-N when the communication state keeps worse than the predetermined state for the predetermined time. Specification, page 13, line 19 to page 14, line 6.

Successively, the TPC bit adjusting circuit 42 adjusts the TPC bit signals supplied from the TPC generators 14-1 to 14-N according to the notification of the quality deterioration supplied from the communication state monitor 41 (Step S502). The TPC bit adjusting circuit 42 supplies the adjusted TPC bit signals instead of the TPC bit signal generated by the TPC generators 14-1 to 14-N to the multiplexers 15-1 to 15-N. Specification, page 14, lines 7-12.

Fig. 6 describes the operation of the communication state monitor 41 in more detail. The communication state monitor 41 monitors a communication state of a radio communication between the base station 10 and the mobile stations 20-1 to 20-N as follows. At first, the communication state monitor 41 finds averages of the determined SNRs per a predetermined time individually on the basis of the SNR signals supplied from the SNR determining circuits 13-1 to 13-N (Step S601). Specification, page 14, lines 13-21.

Next, the communication state monitor 41 compares each of the averages with a predetermined threshold which is considerably lower than the desired SNR. Then, the communication state monitor 41 counts the number of the averages each of which is lower than

the predetermined threshold. Furthermore, the communication sate monitor 41 compares the counted number with a predetermined number (Step S602). Specification, page 14, lines 22-28.

When the counted number is equal to or lager than the predetermined number, the communication state monitor 41 judges that the communication state is worse than the predetermined state and notifies the TPC bit adjusting circuit 42 of the quality deterioration (Step S603). On the other hand, the communication state monitor 41 does nothing when the counted number is smaller than the predetermined number. Specification, page 15, lines 1-7.

Thereafter, the communication state monitor 41 repeats the operation as shown in Fig. 6 at regular time intervals. As illustrated in Fig. 7, when the TPC bit adjusting circuit 42 receives the notification of the quality deterioration from the communication state monitor (Step S701), it changes the first TPC bit signals of the TPC bit signals supplied from the TPC bit generator 14-1 to 14-N into the second TPC bit signals predetermined times (Step S702). In this event, the second TPC bit signals require the mobile stations to reduce the transmission power by the fixed value regardless of the difference between the measured SNRs and the desired SNR. Specification, page 15, lines 8-17.

Because the second TPC bit signals require the corresponding mobile stations to reduce the transmission power, the interference is suppressed. As a result, it can be avoided that the mobile stations waste batteries and that a connection capacity of the mobile communication system becomes small. Especially, in each of the adjoining cells, because the interference from the cell covered by the base station 10 is reduced, the number of the mobile stations communicating with the base station thereof becomes large. Specification, page 15, lines 18-25.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Appellant appeals the rejection of claims 1-42 under 35 U.S.C. §103(a) as being unpatentable over Larijani et al. (U.S. Patent No. 6,603,746) in view of Itoh (U.S. Patent No. 6,481,321).

VII. ARGUMENT

A. *The Rejections based on Larijani et al. in view ofItoh*

1. The Rejections of Claims 1-42 based on Larijani et al. in view of Itoh

Appellant respectfully requests the members of the Board to reverse the aforementioned rejection of claims 1-42 under 35 U.S.C. §103(a) as being unpatentable over Larijani et al. in view of Itoh. Appellant disagrees with the Examiner's rejections because the cited references fail to disclose or suggest at least the following claim limitations of the independent claims:

1. a communication monitor circuit for ***detecting quality deterioration of radio communication with mobile stations***

6. a communication state monitor circuit coupled to said receivers for ***detecting quality deterioration of a communication state of radio communication between said base station and said mobile stations***

14. a communication state monitor circuit coupled to said receivers for ***detecting quality deterioration of a communication state of radio communication between said base station and said mobile stations***

22. monitoring, at said base station, ***a communication state of radio communication between said base station and said mobile stations***

27. detecting, at said base station, ***quality deterioration of a communication state of radio communication between said base station and said mobile stations***

35. a receiver which demodulates transmission signals transmitted from ***plural mobile stations***;

a communication state monitor, coupled to said receiver, ***which detects a deterioration of a communication state of radio communication between said base station and the plural mobile stations***;

37. a receiver which receives, from the base station, a transmission power control signal directing to decrease a power of the signal to be transmitted to the base station in the case where ***a deterioration of a communication sate of radio communication between the base station and the plural mobile stations is detected at the base station;***

39. a communication state monitor, coupled to said receiver, which ***detects a deterioration of a communication state of radio communication between said base station and said plural mobile stations***;

40. detecting, at the base station, ***a deterioration of a communication state of radio communication between said base station and the plural mobile stations***

41. receiving, from the base station, a transmission power control signal directing to decrease a power of the signal to be transmitted to the base station in the case ***where a deterioration of a communication sate of radio***

communication between the base station and the plural mobile stations is detected at the base station

42. detecting, at the base station, ***a deterioration of a communication state of radio communication between said base station and the plural mobile stations***

Larijani et al. is directed to a communication system wherein the transmit power of ***a wireless link*** is adjusted so that link performance meets a target level, the method including dynamically adjusting the target level as a function of the traffic characteristics of ***the link***. Col. 2, lines 60-65. (emphasis added). On the other hand, the claimed invention requires that the base station monitor the communication state of a ***plurality*** of mobile stations. Thus, the claimed "communication state of said radio communication" refers to the quality of a group of individual communications between the mobile stations and the base station. The base station in Larijani et al. includes separate maximum selectors, integrators, statistical power control blocks for each mobile unit. Col. 7, lines 29-42. Larijani et al. does state that a centralized control processor may be used; however, all of the analyses and adjustments are made based on the communication state of each individual mobile unit. There is no disclosure or suggestion of monitoring the quality of a plurality of individual communications between a plurality of mobiles units and the base station and making a judgment based on the state of communication of all a plurality of communications.

Regarding Itoh, that reference fails to make up for the deficiencies of Larijani.

Regarding the dependent claims, they should be allowable at least based on their dependence from the independent claims above for at least the same reasons.

For at least these reasons, Appellant requests that the members of the Board to reverse the aforementioned rejections of claims 1-42.

2. The Rejections of Claims 2, 5, 10, 13, 18, 21, 23, 26, 31 and 34 based on Larijani et al. in view of Itoh

In addition, regarding claims 2, 5, 10, 13, 18, 21, 23, 26, 31 and 34, each of these claims require that the total interference electric power be monitored. Neither Larijani et al. nor Itoh discloses or suggests monitoring or measuring the total interference electric power of a plurality of communications between a plurality of mobile stations and a base station and making a judgment based on the total interference electric power.

Therefore, for this additional reasons, Appellant requests that the members of the Board to reverse the aforementioned rejections of claims 6-21 and 27-42.

3. The Rejections of Claims 3, 11, 19, 24 and 32 based on Larijani et al. in view of Itoh

In addition, regarding claims 3, 11, 19, 24 and 32, each of these claims require that signal to noise ratios be monitored and the number of signal to noise ratios. Neither Larijani et al. nor Itoh discloses or suggests monitoring or measuring signal to noise ratios of a plurality of communications between a plurality of mobile stations and a base station and the number of signal to noise ratios.

Therefore, for this additional reasons, Appellant requests that the members of the Board to reverse the aforementioned rejections of claims 3, 11, 19, 24 and 32.

4. The Rejections of Claims 4, 12, 20, 25 and 33 based on Larijani et al. in view of Itoh

In addition, regarding claims 4, 12, 20, 25 and 33, each of these claims require that the TPC bit signals be monitored and the number of TPC bit signals. Neither Larijani et al. nor Itoh discloses or suggests monitoring or measuring the TPC bit signals of a plurality of communications between a plurality of mobile stations and a base station and the number of TPC bit signals.

Therefore, for this additional reasons, Appellant requests that the members of the Board to reverse the aforementioned rejections of claims 4, 12, 20, 25 and 33.

Unless a check is submitted herewith for the fee required under 37 C.F.R. §41.37(a) and 1.17(c), please charge said fee to Deposit Account No. 19-4880.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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Date: June 9, 2008

CLAIMS APPENDIX

CLAIMS 1-42 ON APPEAL:

1. A base station of a mobile communication system comprising:

a communication monitor circuit for detecting quality deterioration of radio communication with mobile stations, wherein:

said communication monitor circuit comprises:

a monitor unit for monitoring a communication state of said radio communication;

a judging unit coupled to said monitor unit for judging whether said communication state monitored by said monitor unit is worse than a predetermined state; and

a notifying unit coupled to said judging unit for notifying an external circuit of said quality deterioration when said judging unit judges that said communication state is worse than said predetermined state.

2. A base station as claimed in Claim 1, further comprising receivers for demodulating transmission signals transmitted from said mobile stations to produce demodulated signals, wherein:

said monitor unit is coupled to said receivers for monitoring total interference electric power of said demodulated signals as said communication state; and

said judging unit judges that said communication state is worse than said predetermined state when said total interference electric power is equal to or larger than a predetermined threshold.

3. A base station as claimed in Claim 1, further comprising:

receivers for demodulating transmission signals transmitted from said mobile stations to produce demodulated signals; and

signal-to-noise ratio determining circuits coupled to said receivers respectively for determining signal-to-noise ratios of said demodulated signals, wherein:

said monitor unit, coupled to said signal-to-noise ratio determining circuits, monitors said signal-to-noise ratios as said communication state; and

said judging unit judges that said communication state is worse than said predetermined state when the number of signal-to-noise ratios, each of which is smaller than a predetermined value, is equal to or larger than a predetermined threshold.

4. A base station as claimed in Claim 1, further comprising:

receivers for demodulating transmission signals transmitted from said mobile stations to produce demodulated signals;

signal-to-noise ratio determining circuits coupled to said receivers respectively for determining signal-to-noise ratios of said demodulated signals; and

transmission power control bit generators coupled to said signal-to-noise ratio determining circuits, respectively, for generating transmission power control bit signals based on said signal-to-noise rations, wherein:

said monitor unit, coupled to said transmission power control bit generators, monitors said transmission power control bit signals as said communication state; and

said judging unit judges that said communication state is worse than said predetermined state when the number of said transmission power control bit signals, each of which require an increase of transmission power, is equal to or larger than a predetermined threshold.

5. A base station as claimed in Claim 1, further comprising:

receivers for demodulating transmission signals transmitted from said mobile stations to produce demodulated signals, wherein:

said monitor unit, coupled to said receivers, monitors total interference electric power of said demodulated signals and the number of said mobile terminals communicating with said base station as said communication state; and

said judging unit judges that said communication state is worse than said predetermined state when a changing rate of a ratio of said total interference electric power to the number of said mobile terminals communicating with said base station is equal to or larger than a predetermined threshold.

6. A base station of a mobile communication system comprising:

receivers for demodulating transmission signals transmitted from mobile stations to produce demodulated signals

signal-to-noise ratio determining circuits coupled to said receivers, respectively, for determining signal-to-noise ratios of said demodulated signals;

transmission power control bit generators coupled to said signal-to-noise ratio determining circuits, respectively, for generating said transmission power control bit signals based on said signal-to-noise ratios;

a communication state monitor circuit coupled to said receivers for detecting quality deterioration of a communication state of radio communication between said base station and said mobile stations; and

a transmission power bit adjusting circuit coupled to said communication state monitor circuit and said transmission power control bit generators for controlling said transmission power control bit signals so as to suppress an increase of transmission power of said mobile stations when said communication state monitor circuit detects said quality deterioration.

7. A base station as claimed in Claim 6, wherein said transmission power control bit generators generate the transmission power control bit signals which requires an increase of transmission power of said mobile stations when signal-to-noise ratios are equal to or lower than a desired value; and

said transmission power control bit adjusting circuit decreases said desired value to suppress an increase of transmission power of said mobile stations when said communication state monitor circuit detects said quality deterioration.

8. A base station as claimed in Claim 6, wherein:

said transmission power control bit adjusting circuit changes said transmission power control bit signals so that said transmission power control bit signals require a decrease of said transmission power of said mobile stations.

9. A base station as claimed in Claim 6, wherein said communication state monitor circuit comprises:

a monitor unit for monitoring said communication state of said radio communication;

a judging unit coupled to said monitor unit for judging whether said communication state monitored by said monitor unit is worse than a predetermined state; and

a notifying unit coupled to said judging unit for notifying said transmission power control bit adjusting unit of said quality deterioration when said judging unit judges that said communication state is worse than said predetermined state.

10. A base station as claimed in Claim 6, wherein:

said communication state monitor circuit, is connected to said receivers, monitors total interference electric power of said demodulated signals as said communication state and judges

that said communication state is worse than said predetermined state when said total interference electric power is larger than a predetermined threshold.

11. A base station as claimed in Claim 6, wherein:

said communication state monitor circuit, coupled to said signal-to-noise ratio determining circuits, monitors said signal-to-noise ratios as said communication state and judges that said communication state is worse than said predetermined state when the number of signal-to-noise ratios, each of which is smaller than a predetermined value, is equal to or larger than a predetermined threshold.

12. A base station as claimed in Claim 6, wherein:

said communication state monitor circuit, coupled to said transmission power control bit generators, monitors said transmission power control bit signals as said communication state and judges that said communication state is worse than said predetermine state when the number of said transmission power control bit signals, each of which require an increase of transmission power, is equal to or larger than a predetermined threshold.

13. A base station as claimed in Claim 6, wherein:

said communication state monitor circuit, coupled to said receivers, monitors total interference electric power of said demodulated signals and the number of said mobile terminals communicating with said base station as said communication state and judges that said

communication state is worse than said predetermined state when a changing rate of a ratio of said total interference electric power to the number of said mobile terminals communicating with said base station is equal to larger than a predetermined threshold.

14. A transmission power control system for use in a base station of a mobile communication system, said base station including receivers for demodulating transmission signals transmitted from said mobile stations to produce demodulated signals, signal-to-noise ratio determining circuits coupled to said receivers, respectively, for determining signal-to-noise ratios of said demodulated signals and transmission power control bit generators connected to said signal-to-noise ratio determining circuits respectively for generating said transmission power control bit signals based on said signal-to-noise rations, said transmission power control system comprising:

a communication state monitor circuit coupled to said receivers for detecting quality deterioration of a communication state of radio communication between said base station and said mobile stations; and

a transmission power bit adjusting circuit coupled to said communication state monitor circuit and said transmission power control bit generators for controlling said transmission power control bit signals so as to suppress an increase of transmission power of said mobile stations when said communication state monitor circuit detects said quality deterioration.

15. A transmission power control system as claimed in Claim 14, wherein:

said transmission power control bit generators generate said transmission power control bit signals which require an increase of transmission power of said mobile stations when said signal-to-noise ratios are equal to or lower than a desired value; and

said transmission power control bit adjusting circuit decreases said desired value to suppress an increase of transmission power of said mobile stations when said communication state monitor circuit detects said quality deterioration.

16. A transmission power control system as claimed in Claim 14, wherein said transmission power control bit adjusting circuit changes said transmission power control bit signals so that said transmission power control bit signals require a decrease of said transmission power of said mobile stations.

17. A transmission power control system as claimed in Claim 14, wherein said communication state monitor circuit comprises:

a monitor unit for monitoring said communication state of said radio communication;

a judging unit coupled to said monitor unit for judging whether said communication state monitored by said monitor unit is worse than a predetermined state; and

a notifying unit coupled to said judging unit for notifying said transmission power control bit adjusting unit of said quality deterioration when said judging unit judges that said communication state is worse than said predetermined state.

18. A transmission power control system as claimed in Claim 17, wherein:

said monitor unit, coupled to said receivers, monitors total interference electric power of said demodulated signals as said communication state; and

said judging unit judges that said communication state is worse than said predetermined state when said total interference electric power is equal to or larger than a predetermined threshold.

19. A transmission power control system as claimed in Claim 17, wherein:

said monitor, coupled to said signal-to-noise ratio determining circuits, monitors said signal-to-noise ratios as said communication state; and

said judging unit judges that said communication state is worse than said predetermined state when the number of signal-to-noise ratios, each of which is smaller than a predetermined value, is equal to or larger than a predetermined threshold.

20. A transmission power control system as claimed in Claim 17, wherein:

said monitor unit, coupled to said transmission power control bit generators, monitors said transmission power control bit signals as said communication state; and

said judging unit judges that said communication state is worse than said predetermine state when the number of said transmission power control bit signals, each of which require an increase of transmission power, is equal to or larger than a predetermined threshold.

21. A transmission power control system as claimed in Claim 17, wherein:

said monitor unit, coupled to said receivers, monitors total interference electric power of said demodulated signals and the number of said mobile terminals communicating with said base station as said communication state; and

said judging unit judges that said communication state is worse than said predetermined state when a changing rate of a ratio of said total interference electric power to the number of said mobile terminals communicating with said base station is equal to larger than a predetermined threshold.

22. A method of controlling transmission power of mobile stations from a base station of a mobile communication system, comprising:

monitoring, at said base station, a communication state of radio communication between said base station and said mobile stations;

judging, at said base station, whether said monitored communication state is worse than a predetermined state; and

notifying, in said base station, an external circuit of said quality deterioration when said communication state is judged to be worse than said predetermined state.

23. A method as claimed in Claim 22, comprising demodulating transmission signals transmitted from said mobile stations to produce demodulated signals, wherein:

total interference electric power of said demodulated signals is monitored as said communication state; and

said communication state is judged to be worse than said predetermined state when said total interference electric power is equal to or larger than a predetermined threshold.

24. A method as claimed in Claim 22, comprising demodulating transmission signals transmitted from said mobile stations to produce demodulated signals and determining signal-to-noise ratios of said demodulated signals, wherein:

said monitoring periodically monitors an average of said signal-to-noise ratios as said communication state; and

said communication state is judged to be worse than said predetermined state when the number of signal-to-noise ratios, each of which is smaller than a predetermined value, is equal to larger than a predetermined threshold.

25. A method as claimed in Claim 22, comprising demodulating transmission signals transmitted from said mobile stations to produce demodulated signals, determining signal-to-noise ratios of said demodulated signals and generating transmission power control bit signals on the basis of said signal-to-noise rations, wherein:

said transmission power control bit signals are monitored as said communication state; and

said communication state is judged to be worse than said predetermine state when the number of said transmission power control bit signals, each of which require increase of transmission power, is equal to or larger than a predetermined threshold.

26. A method as claimed in Claim 22, comprising demodulating transmission signals transmitted from said mobile stations to produce demodulated signals, wherein:

total interference electric power of said demodulated signals and the number of said mobile terminals communicating with said base station are monitored as said communication state; and

said communication state is judged to be worse than said predetermined state when a changing rate of a ratio of said total interference electric power to the number of said mobile terminals communicating with said base station is equal to or larger than a predetermined threshold.

27. A method of controlling transmission power of mobile stations of a mobile communication system by use of transmission power control bit signals transmitted from a base station, comprising:

demodulating transmission signals transmitted from said mobile stations to produce demodulated signals;

determining signal-to-noise ratios of said demodulated signals;

generating said transmission power control bit signals on the basis of said signal-to-noise rations; :

detecting, at said base station, quality deterioration of a communication state of radio communication between said base station and said mobile stations; and

controlling, at said base station, said transmission power control bit signals so as to suppress an increase of transmission power of said mobile stations when said quality deterioration is detected.

28. A method as claimed in Claim 27, wherein said transmission power control bit signals, which require an increase of transmission power of said mobile stations, are generated when said signal-to-noise ratios are lower than a desired value, and

said desired value is decreased to suppress an increase of transmission power of said mobile stations when said quality deterioration is detected.

29. A method as claimed in Claim 27, wherein:

said transmission power control bit signals are changed so that said transmission power control bit signals require a decrease of said transmission power of said mobile stations.

30. A method as claimed in Claim 27, wherein detecting comprises:

monitoring said communication state of said radio communication;

judging whether said monitored communication state is worse than a predetermined state; and

notifying said quality deterioration when said communication state is judged to be worse than said predetermined state.

31. A method as claimed in Claim 27, wherein:

total interference electric power of said demodulated signals is monitored as said communication state; and

said communication state is judged to be worse than said predetermined state when said total interference electric power is equal to or larger than a predetermined threshold.

32. A method as claimed in Claim 27, wherein:

said monitoring monitors each of said signal-to-noise ratios as said communication state; and

said communication state is judged to be worse than said predetermined state when the number of signal-to-noise ratios, each of which is smaller than a predetermined value, is equal to or larger than a predetermined threshold.

33. A method as claimed in Claim 27, wherein:

said transmission power control bit signals are monitored as said communication state; and

said communication state is judged to be worse than said predetermined state when the number of said transmission power control bit signals, each of which require an increase of transmission power, is equal to larger than a predetermined threshold.

34. A method as claimed in Claim 27, wherein:

total interference electric power of said demodulated signals and the number of said mobile terminals communicating with said base station are monitored as said communication state; and

said communication state is judged to be worse than said predetermined state when a changing rate of a ratio of said total interference electric power to the number of said mobile terminals communicating with said base station is equal to or larger than a predetermined threshold.

35. A base station in a mobile communication system comprising:

a receiver which demodulates transmission signals transmitted from plural mobile stations;

a communication state monitor, coupled to said receiver, which detects a deterioration of a communication state of radio communication between said base station and the plural mobile stations;

a transmission power control signal adjusting circuit, coupled to said communication state monitor, which controls transmission power control signals so as to decrease the

transmission power of the plural mobile stations if said communication sate monitor detects the deterioration; and

a transmitter, coupled to said transmission power control signal adjusting circuit, which transmits the transmission power control signals to the plural mobile stations.

36. A base station according to claim 35, wherein, said communication sate monitor monitors an interference power of the transmission signals received by said receiver, and detects the deterioration of the communication sate based on the interference power.

37. A mobile station among plural mobile stations, in a mobile communication system, comprising:

a transmitter which transmits a signal to a base station;

a receiver which receives, from the base station, a transmission power control signal directing to decrease a power of the signal to be transmitted to the base station in the case where a deterioration of a communication sate of radio communication between the base station and the plural mobile stations is detected at the base station; and

a transmission power controller which decides a transmission power of the signal to be transmitted to the base station based on the transmission power control signal.

38. A mobile station according to claim 37, wherein, the deterioration of the communication sate is detected based on an interference power of transmission signals, from the plural mobile stations, received by the base station.

39. A mobile communication system comprising a base station and plural mobile stations, wherein said base station comprises:

a receiver which demodulates transmission signals transmitted from said plural mobile stations;

a communication state monitor, coupled to said receiver, which detects a deterioration of a communication state of radio communication between said base station and said plural mobile stations;

a transmission power control signal adjusting circuit, coupled to said communication state monitor, which controls transmission power control signals so as to decrease the transmission power of said plural mobile stations if said communication sate monitor detects the deterioration; and

a transmitter, coupled to said transmission power control signal adjusting circuit, which transmits the transmission power control signals to the plural mobile stations, and

each of said mobile stations comprises:

a transmitter which transmits a signal to said base station;

a receiver which receives one of the transmission power control signals from the base station; and

a transmission power controller which decides a transmission power of the signal to be transmitted to said base station based on the transmission power control signal received by said receiver.

40. A method, for a mobile communication system comprising a base station and plural mobile stations, comprising:

demodulating transmission signals transmitted from the plural mobile stations;

detecting, at the base station, a deterioration of a communication state of radio communication between said base station and the plural mobile stations;

controlling, at the base station, power control signals so as to decrease the transmission power of the plural mobile stations if said communication sate monitor detects the deterioration; and

transmitting the transmission power control signals to the plural mobile stations.

41. A method, for a mobile communication system comprising a base station and plural mobile stations, comprising:

transmitting a signal to the base station;

receiving, from the base station, a transmission power control signal directing to decrease a power of the signal to be transmitted to the base station in the case where a deterioration of a communication sate of radio communication between the base station and the plural mobile stations is detected at the base station; and

deciding a transmission power of the signal to be transmitted to the base station based on the transmission power control signal.

42. A method for a mobile communication system, comprising a base station and plural mobile stations, comprising:

demodulating transmission signals transmitted from the plural mobile stations;

detecting, at the base station, a deterioration of a communication state of radio communication between said base station and the plural mobile stations;

controlling, at the base station, transmission power control signals so as to decrease the transmission power of the plural mobile stations if said communication sate monitor detects the deterioration;

transmitting the transmission power control signals to the plural mobile stations;

transmitting a signal to the base station;

receiving one of the transmission power control signals form the base station; and

deciding a transmission power of the signal to be transmitted to the base station based on the transmission power control signal received.

EVIDENCE APPENDIX:

None.

RELATED PROCEEDINGS APPENDIX

None.